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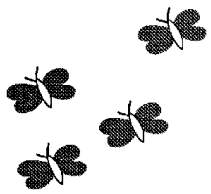
Farming with Beneficial Organisms

Agriculture and Natural Resources Fact Sheet #513



Farming with beneficial organisms can reduce the need for pesticides and promote pollination. The use of beneficial organisms to control harmful pests and promote healthy plants requires some understanding of the dynamic interactions among environment, pest, and host. It is important to identify and consider the life system of both pest and beneficial species, as well as the conditions which attract and promote populations of beneficial organisms. Active field observation of all species of economic concern, both plant and animal, is critical for creating habitat for beneficial organisms. Here are some definitions and tips to help encourage beneficial organisms on the farm.

Definitions

There are four major types of beneficial organisms: pollinators, predators, parasites, and pathogens.

Pollinators include insects like honey bees, mason bees, and alkali bees, flies, butterflies, and moths.

Photo Courtesy Agriculture Research Service, USDA

Photo by: Alan Eaton, UNH

Predators are organisms, in either larval or adult form, that directly attack and consume their prey. Examples are ladybird beetles, lacewing larvae, and damsel bugs.

Parasites often lay eggs in or allow their larvae to feed on a living host (e.g., wasps lay eggs inside aphids or caterpillars, and the larvae then feed on the host).

Photo by: Joe Ogrodnick Cornell

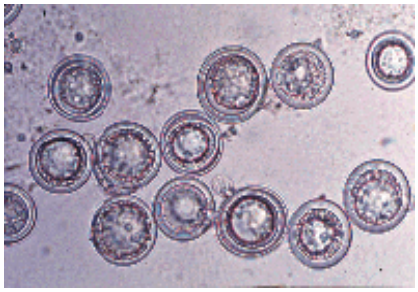


Photo by: Ann Hajek, Cornell

Pathogens are microorganisms (bacteria, fungi, nematodes) which act as a disease to disable or kill host organisms (e.g., Bacillus thuringiensis, or B.t., attacks the digestive system of caterpillars).

Strategies

Strategies to encourage beneficial organisms and discourage pests are based on modifying habitat. The best strategy will incorporate some combination of methods to modify food, shelter, and diversity.

Food

- Supply a variety of food sources so that beneficial organisms are buffered against changes or disruptions to the environment.
- Encourage habitat or native weed species that attract high populations and numbers of beneficial species (e.g., wild caraway, Apiaceae), and that survive mowing, trampling, and insect damage.
- Allow blooming of nonnoxious, native weed species (especially perennials) that provide nectar or pollen.
- It may be possible to use food supplements (honeydew, pollen, or sugar and yeast mixtures are often available commercially) to maintain beneficial populations when existing habitat cannot provide enough food sources.
- Do not eradicate pest species which serve as hosts for beneficial species. Pest species will rebound faster than predator, parasite or pathogen species.

Shelter

- Leave some areas intact (e.g., untilled, unmowed) as sources of food and shelter for beneficial organisms.
- Provide areas of protection from intense sunlight and high temperatures.
- Use alternate strip mowing or harvesting to leave habitat intact for beneficial insects.
- Plant trap crops at the perimeter of a field to serve as refuge for beneficial organisms.
- Provide places where spore, egg, or pupae of beneficial organisms are protected. For example, mulch substrate for overwintering (e.g., predatory mites) or a substrate that is incorporated into the soil (e.g., nematodes, rhizobium on seed).
- Design artificial shelters to provide the appropriate temperature, humidity, shading, dustiness, and topography for juvenile or adult stages of beneficial organisms. For example, place brood boxes for wild bees and predatory wasps at the perimeter of or in unsprayed areas; or leave undisturbed areas for groundbeetles.

Does your farm provide habitat for beneficial organisms during their inactive stages? Consider habitat for beneficial organisms as you prepare your farm for winter.

Diversity

- Create a more stable ecosystem by encouraging a greater diversity of species and supplying structural and spatial diversity (i.e., a variety of plant species and shapes).
- Provide larger habitat areas for greater number of beneficial species, both plant and animal.
- Plant a variety of crops or leave nonnoxious weed populations intact to provide habitat for beneficial organisms.
- Introduce new species as trap crops or cover crops.
- Reduce habitat favored by pest species (e.g. single species crops) while increasing habitat of beneficial populations to encourage a more stable ecological system.

Releasing beneficial organisms

- Many beneficial organisms can purchased commercially.
- Be sure no pesticides have been used recently before releasing beneficial organisms.
- Time releases according to supplier recommendations.
- Be aware that insects may not stay where they are released.

If you choose to spray

- Keep in mind pesticides also kill beneficial species, and without beneficials more work is needed to control pests.
- Use alternate row spraying so that a significant, though reduced, beneficial population is left intact.
- Spray according to the life cycles of beneficial and pest organisms (e.g., spray at night for pests with day-active predators).

<member.aol.com/agattac/index.htm>

Further Information

Learn about Integrated Pest Management **(IPM)**—Encouraging naturally occurring beneficial organisms is a component of Integrated Pest Management (IPM), an approach to pest control which is geared toward keeping pest populations below damaging levels. IPM is an ecologically based pest control strategy based on natural processes and regular monitoring.

Find out about the preferred habitat of beneficial species by doing a little research (invest in a field guide) and making field observations.

Publications

Beneficial Organisms Associated with Pacific Northwest Crops. A Pacific Northwest Extension Publication (PNW 343) available from WSU Cooperative Extension King County for $1.00 plus tax, call (206)296-3900.

Beneficial Insects. Community Horticulture Fact Sheet #15 WSU Cooperative Extension King County, call (206)296-3900.

Farmscaping to Enhance Biological Control. Appropriate Technology Transfer for Rural Areas (ATTRA) P.O. Box 3657, Fayetteville, AR 72702 (800)346-9140.

How to Reduce Bee Poisonings from Pesticides. WSU Cooperative Extension King County WREP 0015 $1.50 plus tax, call (206)296-3900.

Integrated Pest Management: Effective Options for Farmers. Menzies, M.P.M., MacConnell, C.B., and D. Havens. 1995. . WSU Copperative Extension King County EB 1786 $1.00 plus tax. Call (206)296-3900 to order.

Sources for Beneficial Insects. Community Horticulture Fact Sheet #80. WSU Cooperative Extension King County, call (206)296-3900.

Internet Resources

Alternative Farming Systems Information Center <www.nal.usda.gov/afsic>

Appropriate Technology Transfer for Rural Areas ATTRA <www.attra.org>

Biological Control: A Guide to Natural Enemies in North America <www.nysaes.cornell.edu/ent/biocontrol/>

NBCI National Biological Control <www.aphis.usda.gov/nbci/nbci.html>

University of California IPM Online <www.ipm.ucdavis.edu>

WSU Integrated Pest Management Program (509) 335-372; web: <coopext.cahe.wsu.edu/~ipm/>

Supplies

Integrated Fertility Management: resources and supplies to support beneficial organisms. 800-332-3179

AgAttack: products and methods for releasing good "bugs" for agriculture. (209) 625-4598; email: agattac@aol.com; web:

Alternate formats available upon request.
206-205-3100 (TTY 711)

Sources:
Cornwoman, Mariah. "Modifying the Environment to Encourage Beneficial Organisms." Integrated Fertility Management.
Menzies, M.P.M., MacConnell, C.B., and D. Havens. 1995. Integrated Pest Management: Effective Options for Farmers. EB 1786. Washington State University, Pullman, WA.
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